CSIRO

Finewool Newsletter

Issue 7

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CSIRO

PREMIUM QUALITY WOOL COOPERATIVE RESEARCH CENTRE

WOOLMARK

In this Issue:

Editorial

Well here we are with another issue of the Fine Wool Project Newsletter. Since the last issue there have been some significant movements in all sorts of indicators. The 19 micron indicator has moved from around 1000c/kg up to 1600c/kg in September, and then has gradually declined to less than 1200c/kg. My South and Western Australian friends are keen to highlight the comparative movement in the 23 micron index during the same period, which has seen it come from around 500c up to 800c.

While such figures are of concern for fine wool growers, one hopes breeders of fine wool sheep will not be distracted from their long term goals by such short term movements. The long term consumer preferences, as identified by the market intelligence people at IWS, show that softness, lightness and drape are the key attributes. More importantly, if breeders have a program that delivers simultaneous genetic improvement in fleece weight and mean fibre diameter, then they and their clients will always be better off.

The other topical indicator is the Southern Oscillation Index and although it has been recording some positive movements, there remains a significant portion of the fine wool growing area of Australia in drought.

Many fine wool growers are facing the prospect of another major winter feeding program. The challenge is to continue to produce fleeces of high staple strength whilst not adversely affecting the mean fibre diameter.

There is a substantial research effort being undertaken by the Western Australian Department of Agriculture and CSIRO Divisions of Animal Production and Wool Technology, on the interaction between nutrition and staple strength. The results from the Fine Wool Project will also assist us to understand the genetic relationships between staple strength and other components of wool quality and production and ultimately allow us to most effectively incorporate strength into improvement programs.

Another topical subject has been the "rolling skin" approach to Merino breeding. Constructive debate on this subject has been hindered by a lack of properly designed studies to test the value of assessments of skin pliability, staple thickness and tip shape.

The 11 flocks of the Fine Wool Project are an excellent vehicle for such an evaluation and we will continue our efforts to have the sheep in this flock assessed by the proponents of the "rolling skin" philosophy, so that all breeders have information on the value of these selection criteria for improvement of fine wool flocks.

In this issue of the Fine Wool Project newsletter we feature a tribute to Peter Nivison by local writer, Narelle Morse. There have been few people who have made a greater contribution to innovation in Merino breeding programs than Peter. The Fine Wool Project would not have got off the ground without Peter's assistance and encouragement. All those people associated with the Fine Wool Project extend sympathies to his family and friends.

Also in this issue of the Newsletter there are articles by Andrew Swan and John Lax based on results from the flocks of the Fine Wool Project. By July, when we hold our next Annual Classing Day and Seminar, we will be in a position to put some real "oomph" into the information we will have to present. There are exciting times ahead for the Project.

Ian Purvis
Leader, Wool Quality Project
CSIRO, Division of Animal Production

Fine Wool Project at ANFD

Fine Wool Project on display

The Fine Wool Project was under the spotlight at the Australian National Field Days, in Orange from 14 to 17 November 1994. The weather, variable though it can be in this region, was generally quite reasonable, which ensured a steady stream of visitors through the front door - or tent flaps to be more precise.

There were lots of interesting displays in the CSIRO marquee featuring work from the Divisions of Animal Health, Animal Production, Wildlife and Ecology, Entomology and finally Plant Industry. Over the three days, approximately 3500 people of all ages came through for a look at the displays and a chat about what was going in the world of research. Eighty one visitors were interviewed and all these gave positive responses.

Given that over 70% of those interviewed were primary producers in sheep, wheat or beef, it was very pleasing to hear comments like "information was pitched at the right level". Eighty percent of the interviewees said the CSIRO tent had something of relevance to their livelihood/work and the most popular displays were biological control of weeds, exotic animal disease, vertebrate pest control and WOOL RESEARCH.

Having spoken to a significant number of the visitors about our display I can assure the Fine Wool Project that most thought "it was a good display of rural research and that the "hands-on exhibits were good". The Finewool Display did feature hands-on material starting with a microscope showing good quality skin sections demonstrating primary and secondary follicles, fine wool fleeces, two rolls of tops, dyed woollen cloth and an array of wool garments (courtesy M J Hanna & Son) including wool trousers and sports jackets and a 17μ Merino Gold pullover. The clothing was so popular we could have sold the entire range ten times over.

From the Project's point of view I think our display was a resounding success. It is designed to give a broad overview without taking up too much of people's time, moreover, there is further detailed information available if requested. If that is not enough, we noted names and addresses and sent information from Armidale and/or added their names to the Fine Wool newsletter mailing list.

Rob Nethery

WOOLSPEC 94

On 23 and 24 November 1994 CSIRO's Division of Wool Technology and the International Wool Secretariat held a wool specification seminar, *Woolspec 94*, at CSIRO's National Measurement Laboratory in Sydney.

The 240 invited delegates represented all sectors of the industry: woolgrowers, exporters, brokers, processors, scientists, educationalists, and industry consultants. They participated in discussions on the most recent developments in raw wool specification and its implications for marketing, processing, and quality assurance.

Scientists from the Division of Wool Technology presented the latest results of their research, funded by Australia's woolgrowers through IWS and the Australian Government through CSIRO. A major focus of the seminar was the CSIRO Style instrument, which its inventors discussed and demonstrated. This instrument uses image analysis to measure the visual properties of greasy wool staples, specifying the wool in terms of colour, crimp, weathering, and staple dimensions. Experiments have demonstrated close correlation between these new style measurements and subjective assessment and have demonstrated their ability to improve processing prediction.

Significant advances were reported in the prediction of processing performance, a concept which remains central to our work. Specification at all stages of production and processing provides tools for predicting processing results, communication between all sectors of the industry, and quality control. Accurate specification and prediction of its raw and processed attributes puts wool on a comparable footing to other textile fibres.

By understanding issues of processing prediction growers can become more active participants in marketing their wool and in ensuring the quality of wool products. We are now developing formulas to predict the processing performance of individual fleeces and believe that these will have a significant impact on sheep breeding, flock management, and clip preparation.

Another important issue discussed at the seminar was that of contamination, and CSIRO researchers spoke about their work in assessing, predicting, and reducing contamination from pigmented and stained fibres, man-made contaminants such as plastic, and pesticides.

Some of the research discussed was initiated during the early years of the CSIRO Fine Wool Project and, therefore, researchers were able to use some of the wools from these valuable resource flocks in their studies. The research results will be of particular interest to those who follow the progress of this large-scale program. Specific projects which report results partly based on Fine Wool Project flock wools include Dark Fibre Risk, Style Specification (including Handle), and Fleece Processing Prediction.

The edited Proceedings of the ***Woolspec 94*** seminar are **now available** through the Division of Wool Technology. The

Proceedings include question and answers from the presentations and a trade panel discussion. An order form is attached at the end of this newsletter.

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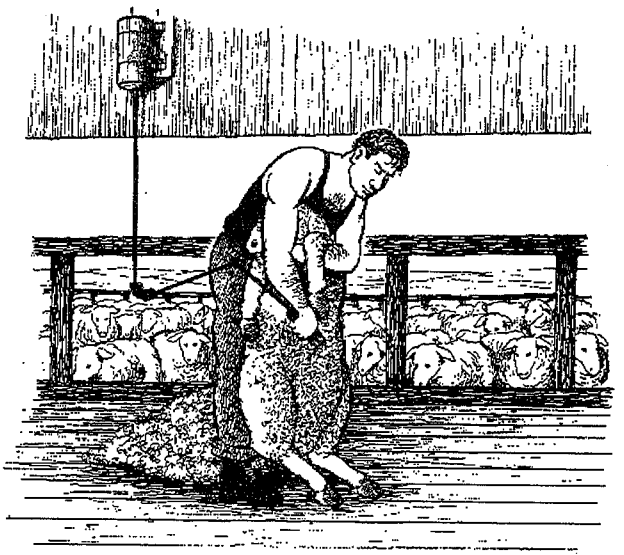


PETER NIVISON

18/1/33 - 8/1/95

WOOL INDUSTRY LOSES A LEADER

Peter Nivison made an outstanding contribution to the progress of agricultural science.

Having built upon a very successful Merino and Poll Hereford stud which he inherited from his father, he leaves a legacy not only for his family, but for all sheep breeders, that will long be remembered.

There are few who have done as much as Peter in regard to the genetic improvement of fine wool Merino flocks.

Peter was a founding member of the Objective Measurement Ram Sale in Armidale and played a vital role in building its reputation. Over the past seventeen years the O.M. Sale has become an important fixture for commercial wool growers and stud breeders alike.

In the late 1980s it was also Peter Nivison who played a leading role in the initiation of the New England Sire Evaluation program. Although sire evaluation schemes for medium wool Merinos have been running since the mid-80s, it took the enthusiasm of Peter Nivison, together with the co-operation of 20 or so others, to get a similar project underway for fine wool.

It was on his family property, Mirani at Walcha that the 16 selected sires ran until 1992, in the initial stages of the evaluation. This involved the use of a straight line of 800 Mirani ewes, the construction of many extra facilities, extra management concerned with collecting and recording data, as well as a lot of labour. Mirani was the chosen site as there wasn't a field station in New England available.

Being a pioneer in the use of computers for farm management and performance recording for both stud sheep and cattle, Mr Nivison made everything necessarily available because he could see the many advantages of the information the evaluation project would provide.

For years Peter had been interested in the program Professor Euan Roberts of the University of NSW was running at Hay and Deniliquin with medium wool sheep, and having obtained his support, was determined that a similar project would commence on the Northern Tablelands.

The New England Merino Sire Evaluation, which commenced at the beginning of the decade, is now run in conjunction with the University of NSW, CSIRO Division of Animal Production and NSW Agriculture on Gostwyck and Birrahlee near Armidale, NSW.

Peter's foresight and enthusiasm will be missed within the wool industry.

Narelle Morse

LAMBING, 1994

Despite the drought, 1994 proved to be more than favourable for the fine wool flock. Feed conditions in the plots at mating (May, 1994) were excellent and one would have reasonably expected a high twinning rate. This was not the case as scanning results showed only 14% of ewes to be carrying twins. Hand feeding was commenced very soon after the sheep came out of the mating plots, and the ewes maintained very good body condition.

By lambing (October, 1994) the plots had a good green pick but not enough to sustain the lambing groups for very long, so we were forced to drift ewes and lambs to paddocks at an earlier age than usual. These difficulties notwithstanding, when it is considered that we lambed a total of 1,971 ewes, as well as tagging, weighing, birthcoat scoring the lambs and identifying the dams, our results are just satisfactory.

The 24% mortality rate is high, but a direct result of the drought conditions. The 15% of animals "dry", although not good, is a big improvement on the 1993 figures. We normally have a higher percentage of dries because of our single sire joinings, and the selenium deficiency at Longford. In 1994, prior to joining, the ewes were drenched with selenium, and there is no doubt in my mind that this resulted in an increase of at least 20% in the lambing rate. The management still need to be convinced of this strategy.

Conditions since lambing continued to improve from very good to excellent but as of now (April 1995) things are starting to look unfavourable once again. Although the weaning weights appear to be very good, averaging 18.5 kg, I am certain these weights could be much better if the animals were not mulesed at marking. In my view mulesing at marking is an acceptable practice if marking is carried out not later than mid spring, not in early summer. This viewpoint is not shared by my colleagues. Relevant data appear below.

Richard Farrell

1994 DROP AB75 WEANING

Line	Av. Weight	Count
1	19.15	116
2	18.83	148
3	18.82	149
4	18.52	144
5	18.40	140
6	19.30	117
7	16.98	146
8	20.67	129
9	18.30	116
10	17.50	99
11	17.01	158
Total:	**18.47**	**1462**

Note: 2.2% lost between marking and weaning

	Number
Ewes joined	2331
Ewes lambed	1971
Lambs born	1983
Lambs marked	1495
Lambs weaned	1462

	%
Ewes lambed/Ewes joined	84.6
Lambs born/Ewes joined	85.1
Lambs born/Ewes lambed	100.6
Lambs marked/Ewes joined	64.1
Lambs marked/Ewes lambed	75.8
Lambs weaned/Ewes joined	62.7
Lambs weaned/Ewes lambed	74.2

Weaned - 1994 drops:	Flock A	354
	Flock B	355
	Flock C	393
	Flock D	360
	Total	1462

Fleece Weight - Fibre Diameter Relationships in the Fine Wool Project Flock

by Andrew Swan

The degree of relationship between traits is important in sheep breeding, particularly when there are many traits to consider in breeding goals. Knowledge of the relationships between traits is required to construct selection indexes, and also to predict the changes in other traits brought about by using these indexes. For example, how does selection using a 5% micron premium index affect feed intake?

The relationship between Clean Fleece Weight and Mean Fibre Diameter is particularly important for sheep breeders. Higher fleece weights obviously increase returns, while fibre diameter has a large effect on price (in fact it is by far the most important production variable).

Unfortunately, the two traits are positively related. That is, as fleece weight increases, so does mean fibre diameter. This conflicts with breeding goals which aim to increase fleece weight and reduce (or maintain) diameter. However, the scientific evidence to-date suggests that *although the relationship is positive, it is not strong, and it is possible to achieve such goals*. Most of these studies have been based on medium-wool flocks. The Fine Wool Project has now provided us with the most accurate information on the strength of the relationship in fine-wool flocks.

The relationship between fleece weight and fibre diameter can be viewed at two levels, the first of which is between bloodlines. At this level we are concerned with the average performance of bloodlines relative to each other, information which is useful to ram-buyers in choosing bloodlines.

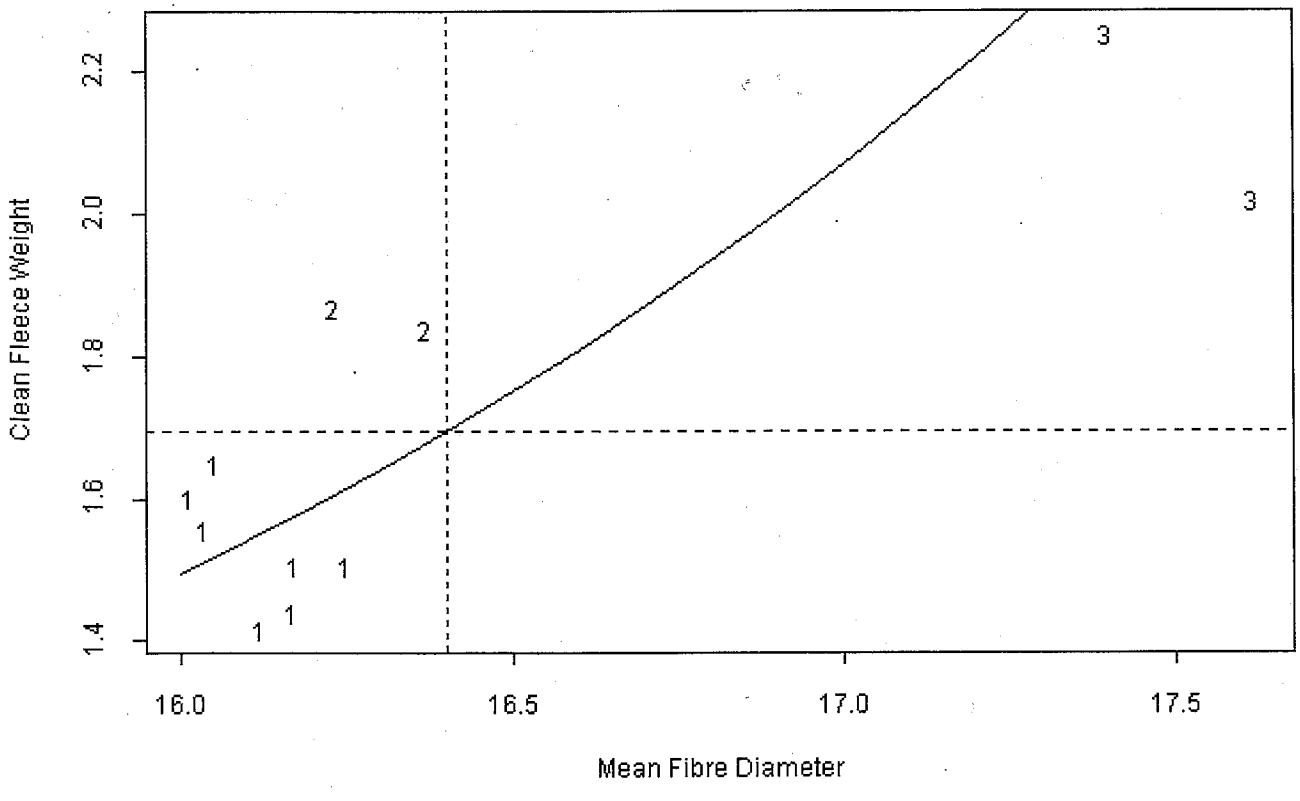
Figure 1 shows the bloodline averages for clean fleece weight plotted against mean fibre diameter, for three years of hogget data in the Fine Wool Project flock. The dotted lines represent the means for the traits across the entire flock. The bloodlines have been allocated statistically to three groups on the basis of their Fleece Weight - Fibre Diameter combination.

The first group identified contains seven bloodlines which could be referred to as "fine" or "superfine". The second group contains two bloodlines which could be referred to as "fine-medium", although they appear to have been separated from group 1 on the basis of clean fleece weight rather than mean fibre diameter. The third group contains the two medium wool bloodlines. Generally, the results show that when fine-wool bloodlines are run in the same environment, the differences between them are small for mean fibre diameter at the hogget age. Differences are larger for clean fleece weight.

The solid line on the graph represents a contour of equal "fleece value", based on auction prices for New England wools in the 1993/94 selling season. The slope of this line reflects the additional fleece weight required to compensate for lower prices received as mean fibre diameter increases.

The three fine bloodlines and the two fine-medium bloodlines above the line are likely to be most profitable. However, other

Fig. 1: Bloodline groupings for hogget CFW and MFD



traits such as style, and management strategies, eg., stocking rates, have not been considered in this simple comparison.

The second level at which the relationship between clean fleece weight and mean fibre diameter is important is within bloodlines. At this level, we are interested in selecting animals, and in particular for ram buyers, in selecting rams. For this purpose, the relationship between the traits is measured as the "genetic correlation". Put simply, this a statistic which may range from 0 to 1 (or -1), where a correlation of 0 indicates that two traits are unrelated, while a correlation approaching 1 indicates a very strong relationship.

The correlation between clean fleece weight and mean fibre diameter calculated in medium-wool flocks is around 0.25, not a particularly strong relationship. Analyses of the small amounts of historical data from fine-wool flocks have shown a stronger relationship with a correlation of around 0.4. This suggests that it is more difficult to simultaneously increase clean fleece weight and reduce mean fibre diameter in fine-wool flocks.

We have now calculated this correlation in the Fine Wool Project flock with greater accuracy. The analysis was confined to the seven fine-wool bloodlines of group 1 in the graph, and the resulting correlation was 0.21, similar to the value in medium-wool flocks. This result is encouraging, as it suggests that it is possible to increase fleece weight in fine-wool flocks without sacrificing diameter.

In summary, the differences between the Fine Wool Project bloodlines are greater for clean fleece weight than they are for mean fibre diameter, and it is likely that there will be significant differences in profitability between bloodlines based on the combination of the two traits. The traits are not strongly related, indicating that selection within fine-wool flocks will be effective.

The Genetics of Style in Fine-Wool Sheep

by Andrew Swan and John Lax

A subjective assessment of "style" using the AWC typing system is included as one of the specifications of wool sold at auction in Australia. Under this system, style is a composite trait influenced by other traits such as crimp definition and frequency, greasy wool colour, brightness, handle and fleece structure. Analyses of auction sales data by the IWS have shown that across the spectrum of Merino wools there are small price premiums for the better style grades. In addition, there are strong perceptions among wool growers that style is particularly important in fine-wool flocks.

Results presented at CSIRO Division of Wool Technology's Woolspec 94 conference (referred to on p.1 of this newsletter) suggest that there are small but significant phenotypic associations between style and processing performance to the top stage, and between style and fabric quality. Denise Stevens and David Crowe presented results showing that better crimp definition and lower crimp frequency is associated with improved top processing performance, reflected by increased length in the top (hauteur), and lower card and noil wastage. Denise Stevens in a separate paper found that soft handle in raw wool translates to perceivably more desirable fabric.

While these results are important in our understanding of the processing characteristics of fine wool, they do not indicate whether it is possible to genetically improve style in fine-wool flocks.

We have conducted an analysis of hogget data from the Fine Wool Project flock to investigate the genetic variation in these traits. The traits considered were subjective assessments of the components of style, including handle, crimp definition, greasy wool colour, dust penetration, and staple thickness. The relationships of these traits with fibre diameter distribution and resistance to compression were also examined.

The results showed that style is moderately heritable, with heritabilities for the component traits ranging from 21% to 35%. The genetic relationships between the traits were also interesting, and are summarised as follows:

- Soft handling wool was associated with reduced dust penetration, better crimp definition, thinner staple formation, and brighter white wool. Soft handle was also associated with low resistance to compression, and to a lesser extent with reduced mean and standard deviation of fibre diameter.
- Regular and evenly crimped wools were associated with bright white wool colour, less dust, softer wool, more desirable diameter distribution, and low resistance to compression.
- Thicker staple formation was associated with harsher handle, more dust penetration, poorer crimp definition, more colour, less desirable diameter distribution, and higher resistance to compression.

These results demonstrate that direct selection on style is possible, and the resulting genetic gains should translate to phenotypic improvement. In turn, this should produce improvements in processing performance as suggested by Denise Stevens and David Crowe above. However, in order to understand more fully the consequences of selection on style and other raw wool measurements, it is necessary to investigate the associations with processing performance at the genetic level. A trial to determine these genetic associations based on the processing of batches made up from sire progeny groups is planned in collaboration with CSIRO Division of Wool Technology.

The associations of style with fibre diameter distribution show that it is possible to select on objective measurements and style simultaneously. Selection to reduce mean fibre diameter is compatible with selection to improve handle and crimp definition.

More accurate information on style will become available when wools from these sheep are objectively measured for style using the technology developed by CSIRO Division of Wool Technology. In addition, style assessments are becoming available on these animals as adults, and similar genetic studies will be conducted for these age classes.